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FINAL REPORT
TECHNICAL ASSISTANCE CONTRACT
PULP AND PAPER

ICA 1802
FOR
FPR YUGOSLAVIA

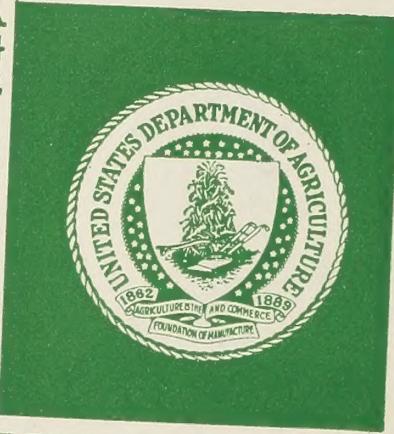
SEPT. 14, 1962

HENRY J. PERRY
PROFESSIONAL ENGINEER
CONTRACTOR

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APR 29 1966

Final Report
of
Henry J. Perry
Contract ICAc 1802

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Scope of Duties

Provide Technical and Economic Advice to the TAA in Pulp
Paper and Converted Products over an 18 Months Period in
Yugoslavia

March 14, 1961 - September 14, 1962

September 14, 1962

Respectfully Submitted

Henry J. Perry
Henry J. Perry
Professional Engineer

Advisor

683250

Acknowledgment

The contractor wishes to express his thanks and sincere appreciation to the members of the Industrijski biro for their valuable assistance and cooperation. Without it the project could not have been carried out.

Director Koselj of Radeče Paper Mill, President of the Paper Association was especially helpful as was Mr. Furian of the TAA-Slovenia.

A. CONCLUSIONS

1. The Yugoslav forests consist of at least 50 % Beech, probably 30 % coniferous species and the balance - Oak, Chestnut, Maple, Poplar and other species.
2. Yugoslavia is therefore faced with a Beech utilization problem which the Pulp and Paper Industry must serve as far as possible.
3. The processing of Beech by the standard sulphate, sulphite and neutral sulphite pulping processes poses no unusual technical problem for the production of unbleached or bleached pulps.
4. The use of these pulps is limited by amounts that can be used on a quality basis as well as by the limited paper tonnages which are produced now.
5. There is evidence that Beech cold soda pulp can be used as a groundwood substitute partially replacing Spruce and Fir. As this groundwood technique is not yet fully developed, it is not recommended.
6. The use of Poplar also poses no unusual technical problems. However, it is a plantation tree requiring, at this time, importation. It is available in limited amounts compared to Beech and its availability depends upon amounts planted, growth rates and cultivation.
7. Poplar will also have approximately the same limited use as Beech in many grades even tho the Poplar pulp is considerably stronger.

CHIEF DIRECTOR
THE ATE GROUP OF COMPANIES

18. These old mills, however, are the reservoirs of skill and craftsmanship.

19. The newer mills while much more modern, lack some of the newer techniques with the resulting low rates of productivity.

As new mills are often built in remote areas the lack of qualified labor is a major problem in the industry. These growing pains take time to cure.

Only by aggressive inspired management inaugurating practical in-plant training can the skilled worker shortage be overcome.

In the expansion of the industry, some cases have appeared where little concern for economic considerations has been given to the project beyond availability of land, labor, and raw materials. In these cases the limited availability of wood or other raw materials has restricted the size of the operation to small submarginal or marginal operations with little chance of competing for export markets or even against the larger units for their share of the domestic market.

The basic engineering knowledge of the pulp and paper engineering groups is very sound. A few of the older men took some practical experience as operators. Among the more important items of operating knowledge is

the ability to maintain a balance between the pulp and paper production.

B. PROGRESSIONS

It is recommended that urgent consideration be given to the following:

closer liaison between the professional foresters, lumbermen, sawmills, logging engineers and wood industries.

The purpose to provide at present more supplies of pulpwood of the preferred species in proper condition for use with a minimum amount of waste and handling.

Establish a wood supply situation that there will be no major difficulties in getting wood as has been indicated. Then the foresters and associated groups should forecast for the pulp and paper industry the amounts of wood by species which will be available for use on a sustained yield basis, the areas and forms in which delivery can be made and the estimated times in years when supply will be available.

The Pulp Industry must then inaugurate a complete development program to meet these changes in their wood pile as would be compiled as a "Pulpwood Report".

The Paper Industry must then inaugurate its development program to make its grades within the limits of the raw material supply.

With the present species at present and for the future, the top priority must be given to the application of research and then the application of this knowledge to practical operation so that maximum consumption is quickly stabilized.

6. A basic "Market Research" program should be started at once to form the foundation for any grade changes in existing mill and for expanded production for the future.
7. A detailed study of each individual mill and each paper machine with supporting equipment should be made. The objectives would be long-range continuous modernization, cost reduction, higher productivity. Changes in raw material and market demand based on forest situation and market research will have important effects on the end results.
8. The Institute role and a sound financial basis which can be supported by the mills must be established. The finest equipment deserves the finest staff procurable. Such a staff must be well-qualified, experienced, progressive, imaginative and executive.
9. The active participation and mandatory attendance at specialized conferences and meetings.
10. The closer liaison and cooperation between the various mill operating staff, various engineers and their groups and research institutions.
11. The wide distribution of translations of foreign literature.
12. The intensive in-plant training to increase the skills of the workers, special symposiums or short courses on specialized subjects are warranted for supervisory personnel.
13. A modification of the bidding and specification techniques to obtain the advantages of advanced technology.

c) The third six months period

1. Advise regarding long term plans for developing production of paper and cardboard into packaging materials.
2. Offer assistance in organizing facilities and training activities for support of this development plan.
3. Be called upon to advise existing paper mills in their reconstruction activities; future production processes; and in their use of domestic available raw materials.
4. Conduct demonstrations ^{xxx} in the use of laboratory testing equipment for quality control ^{xxx}.
5. Perform such other activities ^{xxx}.

II. CONTRACT TERMS AND HISTORY

The contract procedure was first initiated in February 1960. Preparations were made to leave in three months, postponed until September, December, January 1961. Finally a contract signed by the FNRJ was received late February 1961. This was the first indication that it was not an ICA contract. Modification and clarification was requested of ICA because it was signed by the FNRJ, ICA stated that the contract should be reopened upon arrival to clarify and modify as assistance was urgently required.

Upon arrival, after the trip to Madison Wisconsin and a briefing by ICA/W, the industry officer USOM/Y stated that "the contract was obsolete "to make myself generally useful" and "play it by ear". Upon asking for written clarification this officer denied the statement which is contrary to fact.

Later upon a visit to the TAA office with an assistant industry officer the contract was again brought up. The Yugoslavian counterpart stated that the contract was for six months subject to renewal at the option of the Vevče Institute as there was a question of competence of the contractor.

It was stated by the contractor that if there was any question of competence that the contract be terminated forth with and return tickets be provided immediately.

Furthermore, if the contract was for only six months that the TAA notify the contractor within 10 days or that it was for 18 months otherwise it was assumed to be for 6 months and not subject to renewal at anybody's option.

No written confirmation was ever received by the contractor the assistant industry officer reported by phone that USOM/Y had received such a confirmation.

The contractor then proceeded to Ljubljana with his counterpart. A program of activities was received by the contractor from the counterpart as was advance subsistence funds - one days travel allowance at 3,000 Dinars per diem. Program attached (Exhibit 1).

Upon arrival "on station" no provision had been made for living quarters and the hotels were full. At the contractor's suggestion a room was found at the Bellevue, a third class hotel.

As reported in the Monthly Reports of March, April and May, most of the contractor's work was confined to reviewing projects-in-process at the Industrijski biro.

A request was made to the counterpart for basic information so that some idea of the availability of raw materials, chemicals, existing facilities and projected new mills could be developed for a research program at the Institute.

To make this easier a questionnaire (Exhibit 2) was submitted. 17 months later no answer has been received. The blythe answer has been, to why the information has not been received is, that it was submitted to Belgrade for answer.

After insistent demand a laboratory worker was assigned at the Vevče laboratory and a program of cooking coniferous wood was started. For the want of a better objective, it was decided that it was desirable to try and cut the cooking time from 8 hours to 4 hours which was the planned schedule for the Donji Vakuf project. Some initial success was obtained, but when several errors appeared, repeat experiments failed. Lack of interest killed the project uncompleted.

From observation and study of such statistical information as could be obtained it is obvious that Yugoslavia is faced with a super abundance of Beech and a declining supply of coniferous wood. It is equally obvious that the demand for Beech lumber is limited. Thus, it is imperative for the pulp and paper industry to use more Beech or suffer from increasing shortages of pulpwood. Therefore a program of pulping studies using Beech is urgent.

The Institute was asked for a list of its past experimental programs so that a development program could be outlined. A two page list of publications, Exhibit 3, of its senior engineer was supplied covering many years work. From a planning standpoint the list is valueless, because the Institute has or should have done a great deal more, in fact none of its many current projects which were observed and their objectives were limited.

The obvious conclusion is that it wanted no assistance and would not cooperate. Finally action was demanded that a Beech cold soda program be started for all indications pointed to this wide gap in research.

The program was started using such fill-in time as was available. A special preliminary study was finally completed. This experimental work shows that Beech cold soda pulp is as strong as spruce groundwood. However, because of lack of interest at the Institute and continuous stalling on the installation of centrifugal cleaners for a year, the work is incomplete and was finally dropped.

The Institute concluded several years ago that the cold soda process would not work because a mill in Denmark tried it and gave it up. No technical data or explanation was given. All of this in spite of the fact that Yugoslavian wood was sent to America for trial, equipment was bought in the USA and a mill is being built in Zagreb to use the cold soda process.

Several halts were also called in the program using Beech and shifted to Poplar. Aspen is judged to be the "wood of the future" by the Institute based largely on the Italian experience.

Yugoslavia has millions of cubic meters of beech now - Aspen is a plantation tree and ample supplies are probably a generation away as far as can be seen or determined.

Further experimental work was also done on a wide variety of agricultural wastes. A special report was written on this. A program was developed to introduce High Yield Sulphite and super high yield sulphite. No advice was ever asked for and only one result is partially known. In this result the objective was completely missed.

During this initial period the contractor asked to visit the various mills to see their operations, discuss their expansion programs and offer any assistance.

The answer was that the mills has no problems, did not need assistance, according to the Institute.

After 10 months USOM/Y - and TAA Belgrade requested a meeting wherein the resistance of the Institute was outlined and definite corrections demanded. The matter was placed in charge of Mr. Furlan, TAA representative of Republic of Slovenia. After several frank discussions with Messrs. Furlan, Koselj and Bonič, representing the Institute, a memorandum was prepared outlining past problems and future projects. Mr. Koselj as the president of the Paper Association was placed in charge of the contractor's work. The memorandum

(Exhibit 4) was agreed upon. The contractor was given office access, expert stenographic service was restored and a new counterpart assigned. Mr. Prelovšek, who worked in close contact with Mr. Koselj.

Just prior to the series of meetings a second schedule of activity was received (Exhibit 5) (January 10, 1962).

In connection with the second 6 months period of activities, as outlined in the contract, a study of the Institute's functions was to be included. Information was requested as of October 14, 1961 (Exhibit 6). The Institute replied somewhat later by saying that the Institute would supply the information when it had time. None was received. The project was dropped as a result of the Furlan's meetings.

From conversations with the Institute counterpart, it was appointed that the Institute was not a party to the contract. As of June 1961, they had never seen a copy. The contractor loaned his original when some action was demanded. Later on this counterpart reported that none of the "duties" specified were wanted and all the Institute required of an "expert" was someone who could obtain information and answer questions "if asked".

In preparation for the second phase - "study of the Institute" the contractor has obtained information from various pulp and paper research institutions both public and private so that organization, function, financing and training activities could be compared and suitable procedures outlined. This contractor has worked in or with many of these organizations in the past. Furthermore, the contractor was the original organizer of a joint research organization between New York State - the NYS College of Forestry and a world wide group of pulp and paper mills, the Empire State Pulp and Paper Research Associates (ESPRA)).

Since the reorganization of the contract under Koselj work has progressed - reports have been typed and distributed -

visits to paper mills have been made - discussions held concerning problems in operation, reconstruction - new construction and research.

Contrary to previous information, all of the mills visited have been most gracious, all have many operating and other problems and they have cooperated with such information required in most instances. Many of the problems are economic or require equipment so that time way beyond the contract term will be necessary before they can be completed.

All mills of any size have been visited for at least one day - some where an intensive more detailed study was required have been visited for 3 - 4 days.

The reports have been typed and distributed, in addition reports, outlines - suggestions have been written and distributed on

High Yield sulphite
Douglas Fir for pulp production
Cellulose Pulp Process
Kraft Paper Grade, Quality and Collection.

Included in the mill reports are suggestions for speeding up sulphite production, bleaching of groundwood - flow sheets for groundwood - high yield sulphite - elimination of shell or shadow marking - man hour productivity studies; basic information for a research program covering Kraft process viscose pulp from Beech.

Under the heading Performance - various projects undertaken will be detailed and their status reported.

REPORT OF GRAVE PROBLEMS

Travel & Baggage

No specific information was received as to who or where the Paris - Belgrade ticket could be found. Air France stated that they were the agents of JAT, had no ticket and could not find anyone who knew of one. Confirmation was received from the Belgrade office that they had no ticket. The Belgrade office stated that an additional ticket was issued to the contractor (Orly) (Orly) Air France called and stated the schedule had been advanced 4 hours and that there was a JAT office at Orly and that they had a ticket. Air Freight was delayed and if it had not been shipped direct to Belgrade trans shipment would have required several days delay.

Surface Freight was held on the docks at Rijeka because of lost papers. Again this was a direct shipment and it is not known what the delay would have been if it had been via Paris if required. Finally "Transjug" telegraphed USOM/Y trying to locate the papers and received word that the contractor was unknown at the Embassy.

Automobile

The Customs Service refused to accept the terms of the contract on the ground that the TAA had not consulted them prior to signing the contract. This was a case of the provisions were void. This pertained to the car which after some four months delay the car was admitted to the country year retroactive.

Duty has been charged on books and any other material needed for the work in progress.

Stenographic service, etc.

This was originally provided by the Industrijski biro as the Institute had no facilities. It was shut-off in June 1961 because of cost to the Institute. As a result little was provided until TAA took a hand in the latter in January 1962. The Industrijski biro then took over again and results were obtained.

First 6 Months Period

1. Forest Products Laboratory

The U.S. Forest Products Laboratory gave gracious cooperation during the briefing period. Since that time it has continued to supply information and analytical data when requested.

This is typical of the diplomatic corps in Washington who have contributed so much to the development on a world wide basis.

2. Advise and train personnel in Ljubljana

The contractor was primarily assigned to the Institute Papirja Vevče located on the outskirts of Ljubljana. The Institute has been largely equipped thru the U.S. foreign aid program to the extent of \$ 151,000, or more. The equipment is excellent and is at least equal to the best available in similar institution in the USA. It would be considered the best in the world. In comparison the N.Y.S. College of Forestry at Cornell, Maine, U.S. Forest Products Laboratory, and a host of semi-commercial and commercial equipment installed in the American institutions. At present it is located in the Paper Mill Vevče buildings pending the completion of its building in Ljubljana. Much of the American gift equipment is in storage. The new building has been under construction some 15 months and is still not finished.

The Institute is as far as can be determined owned, operated and controlled by Jugoslavian Pulp and Paper Producers association a voluntary membership group. Therefore it's a national rather than republican in scope.

The extent of its financial support by the mills is unclear tho it is reported to be required to be self supporting i. e. it must obtain work or projects which will pay for its operation. Thus the existing mills may sponsor work - new investors and others may also sponsor work and pay for it.

As for the advising and training of Yugoslavian engineers as stated in the contract - the Institute apparently does not have a training function as it was operated during the contract period. Later on, when the building is completed and staffed it is supposed to give advanced instruction to university graduates.

The two senior engineers both with 30 years experience showed only casual interest in any work which was undertaken. The senior pulping engineer who was the operating head of the Institute never asked for any advice, discussed any current projects or their objectives.

The other senior engineer (the English speaking counterpart) arranged for such work to be done as was demanded. He was charged with the paper making problems of the Institute and as such had little to do with pulping. His questions mainly dealt with various paper - quality and conversion activities. Thus both senior engineers had full time Institute jobs and technical assistance was of low priority and an additional work burden to them.

When action was demanded, a skilled competent technician was assigned who showed considerable interest in new knowledge. He was later replaced by a junior engineer (University graduate 1961). This engineer while inexperienced was also anxious to learn and did quite well. Both of the above were not English speaking tho this proved no great obstacle. The latter began an English course.

Thus two men - one a junior engineer and a technician obtained some training and advice.

In addition a young woman engineer was also added to the staff. She like the young man also asked often for information or opinions.

Therefore all of the engineers available, interested or assigned were advised and trained to the limit of time and projects available at the Institute. This covered Cold Soda Processing of Beech, Spruce, Aspen woods and agricultural wastes and semi-chemical pulping of coniferous wood.

In the Industrijski biro the various project engineers were advised, flow sheets and specifications were reviewed when they asked for it. The processes involved were neutral sulphite - kraft - cold soda - groundwood. The species considered were Cotton stalks, Pine, Aspen, Beech, Fir and Spruce.

The projects were Sudan, Donji Vakuf, Zagreb, Plaški, Drvar, Drenovac.

The engineers involved and the contractor discussed each project and in most cases a memorandum was prepared, consisting of notes referring to specific blue prints or flow sheets.

During the first six months period intensive study and development was under way for a rice straw pulp and paper mill for Kočani, Macedonia. The contractor made available information on a similar project. However, his advice was not specifically asked for with this one exception.

An identical plant which had run 4 months and then put in moth balls was for sale in Valencia, Spain. The contractor was asked to find out why it was shut down,

the condition of the machinery and other pertinent information. The information was asked for thru USOM/Y Embassy channels. It was denied unless it could be proven that it was of benefit to the Institute.

It was actually a part of the Institutes counterpart work. However, the information was obtained thru private channels. The mill had been built for political purposes - it had met its production goals, the quality was good - there was sufficient equipment available for twice the production - the asking price was about 50 % of new equipment available for twice the production - the cost could be financed. Arrangements were offered so that the contractor could inspect the plant. Nothing further was ever heard of the matter.

Kočani is being built with new equipment.

Compliance

Advice and training were given to such engineers and technicians as were assigned for limited periods at the Institute.

Advice was given to the pulp and paper engineering group at the Industrijski biro as requested. As part of the visits to the various mills advice was given on pulping problems where these problems occurred.

It should be stated that there is also a pulp and paper school at Vevče and that Ljubljana University trains engineers for the paper industry. No arrangements were made to contact these schools.

7. Develop Plans for the Use of Domestic Raw Materials and Recommend Processes.

Shortly after arrival, the contractor requested information on the various paper making raw materials available - the quantities procurable - chemicals available - cost and plans for industry expansion so that plans could be made for any required research and processes could be selected using domestic chemicals to meet cost expansion demands.

After repeated requests by the contractor and USON/Y none of the information has ever been supplied.

8) Wood

It would be of positive benefit of such statistics as the contractor will have to obtain and by such observation as could be made during limited travel, it is obvious that Birch is the predominant species available. It is believed to comprise some 52% or more of the total standing forest volume. Because of the limited use as lumber and fuel the proportion is most likely to increase as intensive cutting of the choice Spruce, Pine and Fir continues.

As for 'tropical' wood it is judged by the Institute as the 'tropical' of the future. A few small plantations have been observed along the Belgrade-Belgrade railway and such parts of the irrigation have been travelled.

Only species of Populus it has been seen is 20 years away from pulp wood size if sufficient volume has been planted.

It is agreed by all that Populus is the preferred species of all hardwood or broadleaf species, but it cannot replace coniferous woods entirely.

Proposed utilization of pulp and wood wastes, including
the following in timberland areas:

1. Beech - "wood of the future" requires good land
and long-term cultivation and 20 - 25 years plus
long fibres. The Fir and Spruce to overcome some
attractive difficulties.

Other older species growing - Alder, Birch, Maple,
Cottonwood - each is limited to small volumes
in scattered areas and constitutes a small source of
supply that can be used.

Thus Yugoslavia is faced with a Beech utilization
problem of immediate priority. Some Beech is currently
used in the sulphite mill for paper and viscose -
none will be used when some of the new Kraft mill
starts operation. Helpful as this may be the volume
used will be small compared to that now standing and
available.

Beech should be adopted as the "wood of the future"
and every avenue of utilization should be fully
explored with a determination to use it.

It poses no problem in Kraft - Sulphite or Neutral
Sulphite processing for use in limited amounts for
paper or for rayon production.

It cannot be used in the conventional groundwood
process.

However, as a substitute for Spruce, Fir or Pine
groundwood, cold water processing offers a method for
a capital cost, as far as can be judged with meager
information, low chemical cost and high yields.

Such pulp can readily be used in newsprint, printing
paper and some lower quality writing papers with
caliper value of 20% or less.

the paper mill to be able to produce 1000 tons of paper per day.

After the war, the contractor felt that Cold Soda pulping should have top priority. The paper mill started, but the final crucial stages of cleaning and bleaching were never completed.

Thus the amounts which could be used for various types of paper could not be determined and questions asked at the various mills could not be answered as completely as they should have been.

b) Paper Article

Wood Stock (waste paper) forms the second major raw material supply to all major paper making installations. Since it is used in Yugoslavia to a limited extent, some is reported to be imported.

Wood Stock is important in several ways, one quality is to obtain some cellulose, more easily bleaching the high quality.

It is particularly important in the following: the quality - grading and collection. This was prepared with the hope that the suggestions would improve the supply. If so, possibly a de-inking plant might be justified to support the cellulose pulp supply.

c) Other Raw Material

As is amply illustrated in the literature, any plant that grows can be processed into pulp.

However, where wood is available, the use of other raw materials is seldom justified except for special purposes.

availability is the deciding factor in most cases. Agriculture economics be probably no exception to the rule. There is no question about the abundance of straw and corn stalks available, and except for some special cases, these are not promising raw materials for the present. Until the wood supply be exhausted or some unforeseen raw material demand occurs, there will be little demand in the foreseeable future.

Of the other remaining plants - bristle, cotton stalks, opium poppy stalks, castor bean stalks, sunflower stalks etc. so little is grown in terms of pulp supply that they do not seem worth consideration tho extensive research has been conducted at the Institute.

Flax and Hemp fiber can assume some importance as cotton or linen rag substitutes for airmail stationery, cigarette paper, currency paper and other thin papers.

These fibers are now used by Rijeka Paper Mill with excellent results. Their increased use at Radeče should be considered.

d) High Yield Pulping Procedures

Because of the apparent shortage of coniferous wood building up for the future, high yield processing has been suggested for Nedvedel. It is also under consideration at Vider-Krčko to the extent that bids are being solicited for equipment.

The objectives are worthy - to obtain yields of 60 - 65 % at brightness of 60 - 70 % compared to the present 42 - 45 %. There are some new techniques in which yields of 80 - 85 % are possible. A preliminary outline for high yield and ultra high yield development was distributed.

process, which is known to have been done on Beech. It utilized the bleaching thru 3 stages to a brightness of over 80 %. The yield dropped to 45 %. The only accomplishment was to substitute chlorine for sulphur in the sulphur consumption. Thus the primary objective was completely missed or negated.

Compliance

In spite of the denial of definite technical and economic information required to properly make suitable plans, a program to utilize Beech was outlined.

However this program was carried to a point where all indications point toward a possible sizeable increase in use for a variety of papers and boards.

Conditions beyond the control of the contractor prevented the completion of the project. A preliminary report of results on Beech - Poplar and Spruce Cold Soda processing was distributed.

A report on wood should be the second largest source of paper making fiber - paper stock - was distributed.

A report on the use of agricultural waste was distributed, oriented to the economic problems involved.

A development high yield and ultra high yield sulphite program was distributed.

No specific recommendations for processing can be made because of the denial of information and the failure to make adequate facilities available by the Institute.

It is most likely however that the Yugoslavian "wood for the present and future" is Beech and its use can be immeasurably increased by the cold soda process and to a lesser extent in the Kraft and sulphite processes.

Assist in the Choice and Installation of Equipment for the Manufacture of Above Pulp and with Its Running-in Operations

The Institut papirja Vevča is a research laboratory which is not involved in the production of an engineering, design or construction of paper machines. Therefore it is not concerned with the choice of equipment or its running-in.

The Institute has one and one procurement program of its own. The purchase of an experimental paper machine for installation in a future second building to be located on the site of the Institute.

The specification was prepared according to the requirements of the Institute. This machine was to be purchased for use in under a \$ 44,000 PIO/T. The specification indicates that the likely suppliers in the USA are: 1. T. J. Williams - two American firms responded - one of these firms has supplied several small machines; 2. Michigan State Mine, University of Western Michigan - was asked to use per specification and approximately \$ 60,000.00 for the standard machines which would be suitable for experimental purposes.

The German bid was approximately \$ 100,000. As a result the Institute countered with a proposal to purchase about \$ 44,000 worth of parts. From these parts the machine would be designed and built in Yugoslavia to specification.

After a long period of service. This latter procedure was recommended on the ground that it did not meet the PIO/T purchase descriptions and designing a machine with minor parts was a hazardous procedure.

The \$ 60,000 paper machine was recommended as adequate for the purpose.

It is understood that USOM/Y increased the PIO/C to £ 60,000.

No "running-in" was possible as delivery will not be made before the termination of the contract and the building will not be completed. Construction of the paper machine building is not contemplated until after the present building is finished.

The Industriski biro on the other hand is actively engaged in the preliminary design, engineering problems, construction and supervision of new construction and modernization of pulp and paper mills as well as many other types of industrial processing.

As has been previously mentioned, the pulp and paper engineering groups asked for reviews of flow sheets, specifications and construction drawings with comments on the processing and equipment to be furnished by the prime contractors.

In most cases as a result of these reviews, suggestions were made concerning the arrangement of equipment and its choice for the purpose of simplification, ease of operation, maintenance, repair part stocks and to save capital costs.

These suggestions were presented to the Industriski biro and to be passed along to the prime contractor as desired. In two cases the prime contractors refused to make changes. The apparent reasons were that the contractors were also the prime manufacturers of the equipment as well as the designers of the plant and did not have a license to make the larger size equipment recommended or did not make the equipment at all, and would not buy it from others or were not familiar with modern processing and would not change without voiding the performance guarantee clauses.

With respect to the first point, the following information is available: (1) The "running-in" period from time of arrival of vehicles to time of first actual supplies delivered is not necessarily the proper period for determining information required to predict the rate of delivery. (2) Vehicles have been placed as a result of the "running-in" period; no deliveries having been made during this period; no assistance and no support.

With respect to the third point, advice has been given to the contractor in discussions, but there has been no attempt to complete any project.

4.2.2.2.2.2

With respect to the fourth point, "running-in" has no effect on the time required for the successful operation, if the proper conditions are impossible.

With respect to the fifth point, the function and the time required for the balance is negligible.

With respect to the "running-in" was possible as the time required for the "running-in" was shorter than procurement time and supplier deliveries made.

There were no salesmen or jobs were completed; the only possible sales help qualities could be added in the sales and marketing functions.

The cold side process piping installed at Daggett
Center will be in operation before the contract
expires.

In the review in the *Streems Mitrovica* it was pointed out that the use of 75 - 85 % copier wood posed some significant production problems.

The Canadian newspaper placards have tried to use popular and have been restricted to about 18%, the following being said 1921:

The author was also discussed with the operators at Videnjaks who confirmed this fact from their own operations.

It was suggested that before the Šenava Mitrovica plant goes along too far, some commercial development be carried out to confirm the maximum speeds, maximum amount of poplar and the effects on quality of product. The work to be done at Vídeň Krško.

The suggestion was turned down by the Institute as undesirable. The reason was that it would interfere with Video production and furthermore if Poplar did not do it, others would be used instead.

A young graduate from the school came to the bistro to offer his two cents on the problem. In the discussion it was pointed out that India Rock would help might be the answer. Unfortunately the note process has contemplated for the second stage experimental designs.

The project engineer wanted to hold up the project pending further experimental work but was over-ruled because the designer's orders had been placed.

Compliance

General suggestions were made that increasing concentration of Beach and Paper were possible in a general way. Closer approximations based on laboratory determinations could not be made because of forces beyond the control of the contractor.

Commercial cold soda process evaluations could not be made until the first commercial plant is in operation, sometime after the contract expires.

There was no valid reason why commercial evaluation of poplar pulp processed by conventional means could not have been carried out to establish the limitations of its use for newsprint.

B. The Second Six Months Period

The first six months activities required about 11 months at which time the activities were reviewed by IAI and USCOM/1 at Belgrade and the conferences with Missus, Tadić, Koselj, and Doneč were held.

As outlined in the memorandum (Exhibit attached) the following changes were made because of time shortages - 8 months remained.

1. No further expansion development and refinement of plans and recommendations was possible. Director Koselj took over the planning of the contractor's activities and Eng. Brelović took over the function of the counterpart.

Compliance

The requirement was dropped - no compliance necessary.

THE INSTITUTE FOR INDUSTRIAL RESEARCH

The Institute appears to be somewhat different in its operating structure than some of the other industrial research institutes.

The difference so far as can be determined is that it is industry supported and operates across the individual republic boundaries. Thus the membership or sponsors represent Slovakia, Croatia, Serbia, Bosnian and probably some parts and Macedonia pulp and paper mills when in operation.

As an industry the Institute doesn't receive no governmental support or subsidies from the individual republics or the national government.

Apparently the existence of the Institute has overhead and liability that the Institute be self supporting. As a result the Institute is forced to bear on projects which add little to the general economic welfare of the nation.

Such projects are those of the exotic plants, such as Banana, Cotton Stalks, Poppy Stalks etc. to mention projects which were observed. This time was concerned which might have been spent on problems which would be of more lasting long range benefit.

Unfortunately the mentioned new building has never been completed and apparently is slowed down because of limited financial resources. It is understood that the sponsors never intended such financial support such as to finance the building project.

As a result of this limited support the present situation is to engage concrete - 2000 cu. ft. of the equipment is for storage and the installation of the paper machine is to be away. No provision has been made for this machine in the new building under construction.

Application for a loan was denied by at least two countries. An application was also made to the Republic of Slove Research Council for a loan - status unknown.

As far as can be learned, the Institute was connected with a close connection with Ljubljana University, offering advanced study in cellulose chemistry and pulp and paper manufacturing.

From observations at the various member (sponsor) mills and the contemplated expansion programs, a central research station in combination with some academic function seems warranted.

The size of the buildings, the extensive equipment supplied by the American people and a proposed staff reported to be about 40 indicates a sizeable operation.

Therefore in anticipation of the second requirement for the second six months period, information was consistently asked for during the first six months. It was formally asked for in a memorandum (Exhibit 6) in October 1961. No information was ever received.

In the contractors opinion and by observation and comments obtained, "defining the role of the Institute" could have been the most important requirement in the contract.

Such an Institute by following well defined functions in applied research, the translation and distribution of foreign research information and some training activity could be of immeasurable benefit to Yugoslavia.

Theoretical research seems for sometime an unnecessary luxury and should be eliminated.

So far as can be determined, there are many unanswered problems and questions unanswered about the Institute.

These briefly are:

1. With the size of the facility and contemplated staff will the industry finance such an organization.
2. With only an anticipated 500.000 tons of annual production is such an organization necessary.
3. With limited production facilities therefore requiring a limited number of engineers just what is the training function to be.

Possibly this has all been worked out, but if so why does the present operation have to earn its own way. Why is the present building not being pushed to rapid completion?

If central research is the plan then why are the new mills equipped with their own extensive laboratory facilities. This seems a duplication of equipment and efforts.

This is further complicated by the organization of a rival research institute at Banja Luka whose dedicated purpose is to concentrate on applied research and to make individual mill research unnecessary. The Banja Luka Institute claims the financial support of the Bosnian and Croatian mills, the largest concentration of the Industry.

Thus it seems vital that the Institute papirja Vevče should know where it is going and how. Finding the answers was contemplated in the contract.

However, the Institute staff failed to provide the information and the subsequent meetings on the contract with Koselj and Furlan cancelled the requirement.

Compliance

Requirement cancelled.

3. Visit Specific Paper Mills and Offer Advice in the Reconstruction and Design of Facilities for the Introduction of More Suitable Processes.

Upon arrival the contractor asked his counterpart to make arrangements to visit the various mills. The purpose was to obtain some background for development planning for applied research and to judge which techniques were in use and consider possible improvements.

The request was denied on the ground that the mills did not want assistance, had no problems and were too busy.

When the new mill at Belisœur started up, it was obviously in production difficulty and the contractor offered his assistance and requested permission to visit the mill. This was also denied on the ground that the mill was under guarantee by the design machinery supplier even though a research project was in progress at the Institute, cooking spent chestnut chips. About one year later, when the contractor visited this mill, it was apparent that the designer-supplier had done little or no development work and was not familiar with the end product requirements. This is most surprising as the designer-supplier of the pulp mill has a world wide reputation for excellence.

The attention of Koseij was called to the reported **attitude** of the mills and a correction of the condition was promised.

Some 10 months after arrival a visiting program was set up which has been carried out during the last six months of 1962:

The mills visited are:

1. Velen Krčko
2. Vrbov
3. Medveda
4. Molnjevo
5. Bedeče
6. Sladkivsk
7. Ceršak
8. Podvelka
9. Prevalje
10. Belišče
11. Zagreb
12. Rijeka
13. Maglaj
14. Banja Luka
15. Trnjevo

Observations and comments on the operations have been prepared and distributed on each of the mills with the objective of comparing them to American and Canadian operations from the techniques employed, productivity and general conditions. Where expansion programs were under consideration, suggestions were made on techniques to be considered, possibilities for increased productivity etc.

These studies were naturally brief because of the time available. Normally the contractor in making such studies would have spent several months at a plant utilizing improved flows, quality, obtaining equipment quotations, relating the improved techniques to cost reduction, increased productivity and higher quality.

However, such brief studies as have been made can guide the thinking of the management in future improvement programs.

any conclusions as to the quality of the offered must be made. In general, these observations would be of little value, but if the data force it to a finding, then the necessary steps of price reduction and compensation should be initiated to correct the problem.

In this regard, if the same mechanics are considered, then even the early 30 years old need extreme caution and re-authorization. Some management tools seem to indicate the correction can be done.

The point, however, is the most important, that the offered additional organizational process good quality and wide diversity of product with suitable equipment. The quality of each product is low in some cases. On compensation basis, prices could be reduced beyond the control of operators.

Certainly, this is a point of discussion, for possible and effective protective activity with respect to the quality of the offered compensation.

Conclusion

The conclusion reached is that of the present public and private firms operate with sufficient data to determine the cost of the service.

In most cases the documents and observations were sufficiently received for making the evaluation and the cost of offering alternative compensation.

The conclusions are summarized as follows: the suggested "plan"

This compensation plan is to be used for the period of one year. The public sector is to continue compensation plan for the same period of one year, according to approach of the service.

Several more years could be devoted to further work in this phase to carry it to a successful conclusion.

C The third & Months Period

1 Advise Regarding Long-term Plans for Developing Production of Paper and Cardboard into Packaging Materials

One of the important points of this requirement was the answers to the basic information questionnaire which was not answered.

The contractor upon receipt of the PIO/Ts in Washington stated that in his opinion this phase was the most important and should have been included in the first six months activities.

This phase is "Market Research" upon which all production, modernization and future expansion rests as a foundation.

Pulp and paper is a service industry for its products as such are valueless unless some one converts them into a useable product or condition; to write on, print on, wrap or package some commodity.

The demand rests largely upon others. All of the per capita consumption rests solely upon the ability of the industry to meet the requirements of its customers the printers and convertors in the grades, quality and forms which these customers demand. These paper users in turn must meet the demand of their customers who in turn fulfill the end users needs.

In some cases, grades of paper and their consumption rests upon the economic status of the ultimate consumer.

For example if a potential customer does not have surplus funds to buy a news paper, a magazine or book there is no need to print the book, magazine or newspaper and therefore no demand for these grades of paper.

In the packaging field unless the customer can afford to buy packaged foods or other commodities or paper saves in distribution costs there is no demand for packaged items. Packaging costs money and unless the cost can be absorbed in cheaper distribution (more efficient handling, shipping or sales) it must be passed along to the consumer.

At the present time packaging is in a transition stage and paper and cardboard are facing fierce competition for the first time in their history.

During the last 30 years it was the aggressive competitor against textile bags, wooden boxes etc.

From now on, paper and paper board is up against unrelaxing price and new product research pressures from plastic films, metal foils and bulk shipments.

Observe the packaging in any Yugoslavian supermarket and note the plastic bags used to replace paper.

Watch any major construction job and note the bulk delivery of cement. It is only a short time away before sugar, flour and other bulk commodities are shipped in a similar manner. Germany, Italy, Canada, and the United States can all serve to illustrate the future competition and trends.

President Nito has expressed himself well and clearly in the saying of "Market Research", and his words apply equally well to paper and paper board as to steel, glass or any other commodity.

However, so far as contractor can determine Yugoslavia has ignored "market research" and can in the near future find that it has surplus capacity for products which no one needs. In the paper field these items can be in wrapping paper, multi wall sacks and some types of bags. Thus "Market Research" is urgent and should be of foremost priority.

Unfortunately no information was received to conduct such a study, no interest was apparent in such a study and as a result of the confidences with Kocelj and Petković the project was dropped.

Completion

Project dropped, the Market Research is the foundation of all modern industry and supporting activity.

2. Offer Assistance in Organizing Facilities and Training Activities at Institute

This phase is a carry-over from the second six months and was cancelled.

Completion

None.

3. Advise Existing Mills in Reconstruction, Future Processing Use of Domestic Raw Materials

This phase is a carry-over from the second six months activities.

Completion

Commented upon under second six months activities.

YUGOSLAVIA INSTITUTE AND LABORATORY FOR PULP AND PAPER INDUSTRY TESTS EQUIPMENT FOR QUALITY CONTROL.

The Institute has received as a gift from the American people an extensive collection of laboratory pulping and paper making equipment. In addition, it has also received practically every known instrument for the testing various paper and pulp physical characteristics. Also included is a wide variety of chemical laboratory analytical equipment.

Thus the Institute has available for use one of the finest collections of apparatus available for pulp and paper physical and chemical evaluations.

From observations, the staff of technicians employed as well as the senior engineers are well versed in the use of this equipment so that little instruction or demonstration is necessary.

In two cases assistance was asked for, in each case, it appeared that the problems were those of difficulty in translating and understanding the manufacturers' instructions. In each case the advice was given and the problem solved.

In as much as most of the equipment installed is common to the pulp and paper industry on a world wide basis and much of it is covered by the official standard Methods of the Technical Association of the Pulp and Paper Industry of which there are 11 individual and one corporate member in Yugoslavia, instruction in use is unnecessary.

Such equipment which is not standard in TAPPI procedure is covered by Swedish, German, French or English testing procedures.

the Institute therefore are available the latest scientific methods for this use as required.

In the conversations and review of the contract with Isabell and Farlan, the requirement was considered to be of minor importance and cancelled.

At this point it might be well to comment upon quality control. The Institute apparently has a quality standardization program for the whole industry under consideration. The objective is to standardize the quality of all the grades produced by all of the mills.

The contractor was asked on several occasions to obtain the American paper standards. It was pointed out that there are no generally accepted U.S. standards applicable to all grades of paper and that under a free enterprise system with free competition no standards are possible. Each mill therefore can produce the quality at any price that it chooses.

The market or the consumer are actually setting the standards by their purchases.

There are some exceptions of course and these were fully explained. These exceptions are:

1. Standards set up on papers by the purchaser as minimum quality requirements. Formally they are set up by the large buyers: Insurance Companies, publishers of large volume magazines such as Time, Life, Reader's Digest etc. American Telephone, G.M., General Electric and many others purchase on specification covering highly specialized technical papers, flex papers, cable wrap, transformer insulation, calculating cards etc.

In some cases these papers are included in the standards of American Society of Testing Materials, but they are not necessarily the standards of the individual companies.

2. Standards set up by the various Governmental agencies who purchase solely upon bid. The chief and best known agency of this type is the U. S. Government Printing Office. These specifications cover every grade of paper purchased by the Public Printer and over the many years of development are judged to be adequate for the purpose. Not only do they include paper quality requirements, but trimming, packaging and shipping instructions in considerable detail. One clause provides for inspection during manufacture.

Other similar specifications are used by the U.S. General Services Administration and by such cities as New York etc.

A copy to the USGPO specifications and 2 sets of standard samples was obtained for the Institute's guidance.

One other governmental agency has a specification of world wide importance. It is the U.S. Treasury's specification for Standard Newsprint. First developed in 1914 and amended thereafter many times.

This is a maximum standard as it is used to define newsprint for duty-free import into United States. As a result it serves generally as the specification for the Canadian and Scandinavian newsprint industry.

3. Standards set up for Inter-State Commerce. These standards were set up by joint action of the railroads, motor transport, shippers, box makers and paper manufacturers in the case of paper and paper board and standardize shipping containers.

They carry the full force of Interstate Commerce Commission regulations. Paper packaging is controlled by Rule 41 of the Uniform Freight Classification.

Every commodity is listed, the manner of packing and specification is detailed.

Many ocean carriers subscribe to its conditions. From observation Rule 41 is commonly accepted in Europe because the box makers certificate is often found on European shipping cases.

In addition to shipping cases, multi wall sacks, fiber drums and pails are included.

A copy of the Uniform Freight Classification including Rule 41 was obtained for the Institute. Yugoslavia could well adopt such a rule for its shipping containers, because it is forced to comply on any shipments exported to the United States and Canada.

- 4. Individual Paper Manufacturers Quality Specification

Each individual U.S. and Canadian mill has its own quality control system and standards. These of course vary from mill to mill grade to grade.

The purpose is for cost control and uniformity of product with the end result of customer satisfaction. One mills system was outlined in the Vevče paper mill report. It was included for the guidance in setting up its own quality control system.

Vidém Krčko has a quality control system in operation. Possibly some of the other mills do likewise. It is control its raw materials, production and quality.

Specifications set up at Trade Customs. Down the years certain trade customs have been developed which have assumed the weight of specifications, the main ones in force and generally accepted the standard sizes and basic weights and thicknesses for weight, thickness and width, subject to some tolerances.

For the analysis of the data, the following variables were considered: gender, marital status, age, education level, and annual household income.

Sampling

The sampling strategy adopted was given as follows: the population was partitioned into different and homogeneous groups, called strata.

The population was randomly dropped into 47 strata of 100 individuals each. The strata were defined as follows:

For a mill waste it would have to be sorted into quality groups in the saw mill. Either all saw logs must be sorted for pulp should be sorted prior to sawing or the logs broken after sawing, otherwise the waste is not really available.

It is suggested that some mills choose on a cycle basis sawing all coniferous wood at times - all broadleaf at other times - so that the supply flow by species is more continuous. (economical storage in the material flow is necessary for a pulp mill to operate efficiently and to meet the production demands of the paper mills.)

At present saw mill waste is handled with wire ties and can be sold by the saw mill either as pulpwood or fuel wood.

More uniform flow would result if the pulpwood demands were closely scheduled. Better handling methods could be developed by continuous chipping - outside chip storage and more efficient hauling of cars and trucks to lessen the weight of the loads. Better quality chips could be a result.

Numerous system for handling, shipping, banking and chipping down pulp wood and saw mill waste are available to meet any need or condition.

In fact as could be determined the pulpwood industry has not adopted any of them the only use is in North America, Canada and France.

As far as the availability of wood is concerned, this has been covered in some length in other sections of the report.

The lumber in the region is the species with a growing acreage of the preferred species - spruce, fir and pine. Unfortunately, these are the most important species in demand for lumber as well.

and the simple reason that the only truly common
preferred species for ground-cover and bank-filtering is
among the less preferred species (even in the case of
extenuation). The situation would not change much if
one grows every day the proportion to the preferred
species (which are the required right kind) in
the following ratio:

1. a conservative decreased use of each pulp in the species
mixtures according the maximum capacities;

2. much more intensive forest management of regard to
increased coniferous growth and the prevention of
further invasions of weeds in the coniferous areas.

3. the tree planting of exotics - Douglas fir, cedar,
fir, etc. which, if of some importance, will be the
second or third in importance projects of speculative
forests.

III. CONCLUSION

The solution of the forest problems of the largest countries has
been found to be a temporary storage supply. This supply
will depend on the importance of collection, sorting,
storage and transportation to the massive consumption
of paper and of paper board.

Advances in oxygen conversion technology in the use of
plastics and metal-like substances and containers are likely
to correct the supply from the future.

REFERENCES

1. The United Nations Conference on Environment and
Development. The Conference on Environment and Development
will use the principles of sustainable development in which the
two

and the cost of the plant and labour. The last item is probably the most important, since the product does not make a profit unless costs of production are less than those of the selling price. This is a condition of economic equilibrium and results in the maximum utilization of the existing or planned plant construction facilities.

The actual situation of a pulp and paper mill is a little more difficult to analyze, as the site of a new mill is not necessarily an "intersection" of the transportation lines of raw materials or supplies. Certainly the raw supplies are limited and the estimate of the minimum long distance per ton of paper must be purchased.

Finally it is worth pointing out that the planned raw material supply is limited.

Rough Value of lumber.

All of these factors are relatively small and easily restricted by low availability of material.

3.1 Transportation

The transportation problem is unique because of the cost of moving large quantities, both in raw materials and finished products.

As a result, some of the timber is processed in the reporting districts, where distances are short and the cost of transportation is low.

It would seem that some better value of timber could be obtained by looking into the use of pulp and paper operations or that alternative boats to land roads could be more efficient carriers.

Rough Value of lumber - higher - Evengrad and possibly some others are examples of this condition.

Industrial Locations

There is no question that some sites were chosen to make work and spread industrialization into the more remote areas.

Paper-making is an industry requiring a high degree of skill acquired only by years of experience and training.

As a general rule, remoteness, lack of cultural benefits will not attract the skilled labor nor the technicians or engineers required as long as they can find employment elsewhere. Extra compensation - extra benefits are most often required to attract the skilled personnel required, all of which adds to the over head costs.

Some of the new mills may be faced with a difficult recruitment problem. One large mill probably already suffers from this problem.

Building Conditions and Area

Site specific location within area can often be corrected. Not possible locations have problems of nature - earth quake, flood, wind and unstable terrain which can eliminate certain sites.

2) Power

Yugoslavia is blessed with ample electric power resources and a constantly expanding power grid so that most of the industrial areas can be easily reached. There may be some power problems in the remote areas.

Coal however may pose long distance transport as a transport problem coal gas being true to help to an equal weight of the paper produced.

Effluent Disposal

Regardless of the process used, effluent must be discharged. Regardless of the recovery system, some effluent may be obnoxious therefore dilution of the effluent is vital.

The dilution factor of course varies by the process used and the down stream use of the flow and the volume flow rates.

No obnoxious conditions were observed because most mills were on large rivers with large flows.

The question of dilution can arise at head water sites. The decision then must be made as to whether industry is more important than fishing or tourism. The merits of each case must be carefully weighed.

Of the many other factors involved - market research has been commented upon elsewhere.

Plant Size and Labor Productivity seem most important in Yugoslavia. While there is no question that some small mills can be profitable to meet domestic requirements if high prices can be obtained in a controlled economy.

In export it is another matter. Plant size or capacity and the capital cost of the plant become extremely important.

So far as is known the optimum size of pulp and paper mills for Yugoslavia has never been determined and as a result many small units have been built which may restrict their competitive position in export or preclude their ability to compete internally.

No present mill or one under construction approaches in capacity the mill capacities required to be competitively profitable in North America.

For example few new mills in that continent would be considered with a capacity of less than 300 tons per day and most would be built for 500 tons to reach the minimum capital investment per daily ton of capacity.

The present and projected units in Yugoslavia range from 35 - 125 tons per day.

While some factors such as the cost of construction labor are cheaper in Yugoslavia than elsewhere, construction time is longer, more men are needed etc. so that some of the Yugoslavian costs advantages can be cancelled.

Without detailed study and determination, it however seems likely that minimum size pulp and paper operations should be designed for at least 150 tons and possibly 200 tons per day if low cost paper is to be available for export or domestic consumption.

From observation and study a very low labor productivity is noted. In general, at least three, sometimes four and in some cases more men are needed than in North America.

The reasons are many but among the most important are slow speed, narrow machines, in some cases many small units, where fewer large units would be amply suitable. In some notable cases it is obsolete equipment, lack of proper material flow, manual handling, automatic control of operation.

The end result is that with the high capital investment required, the low productivity obtained, the Yugoslavian worker, regardless of work classification, is destined to be paid low wages, if his product is to compete.

2. Plant Location Problems

In the contractors travels and consideration of new projects it has been noted that plants seems to be located on region or republic basis, and some of the commonly accepted criteria used for choosing plant sites is often ignored.

In several cases the plant sites chosen have imposed unwarranted economic burdens on the operation.

Among the economic factors which must be considered in any choice of site are:

1. Water - quality - quantity
2. Raw material - availability - suitability
3. Transportation
4. Availability of skilled labor
5. Building conditions and area
6. Power
7. Effluent disposal

To the above must be added the products to be made as developed by the Market Research, economic factors governing plant size, labor productivity, labor turn-over.

4. Water Supply

So far as is known all of the mills located on main rivers have ample supplies of water under any conditions of flow.

In some cases water treatment is required for silt removal, in other cases there may be stresses where treatment is unnecessary. Iron may be present in some streams which creates a color problem.

In some of the more remotely located mills on the head waters of rivers - water supply could be insufficient during droughts.

The document specifies the size and types of all major items of equipment, details of construction, the standards of design and, generally, of plant etc. It gives the revised figures for the civil design work has been completed and the prospective contractor needs only to supply the equipment.

On the other hand, the *suppose* clause is used to introduce a hypothesis. For example, the *suppose* clause *suppose that* is used to introduce a hypothesis that is not true but is being considered for the sake of argument.

governmental regulations, and quality of service.

Contractors, contractors, and their employees, plant managers, engineers, and other personnel, new equipment and a large quantity of construction supplies, and some of the existing items are discussed in the following chapters.

Actual bid specifications are not specifications at all, but merely a starting point for exploration of the project requirements.

A great amount of time has been spent preparing this document, collecting capacities, preparing item sheets, which may not have any influence on the final results.

In reality the prospective bidder is asked to make a bid estimate, and then to add to his proposal, which all conceivable, item return to his home office to be filled, and to make up complete bills of materials, price each item, the engineering form, costs of construction, supervision, contingencies to cover guarantees, lifting charges, construction of working and final a profit on top of this.

It is this type of considerable collaboration, sorting out sensible items and on the part of the prospective bidder mainly on specification or outlining an order.

This method of selling for this is supply complete plants for a plant, which stated because that each manufacturer makes everything that is required, an extensive catalog, the bidder must buy a great many items on the outside, and purchasing, disburse or adding purchasing difficulties.

In this case, one bids will and prior will consider the bid to be the lowest prices in the case of reliable and good supplier, the plant will not be in this position.

Furthermore, as the bid is competitive, he will choose items on a basis of price alone.

There is every indication that advanced techniques, equipment design and operating know-how are lacking.

In time of wide pulp and paper expansion such as is occurring in Europe now, many of the major suppliers will not bother with such costly bidding procedures and thus eliminate themselves automatically.

As a result the smaller, less skillful concerns or those machine shops trying to gain a foot hold in the paper industry machinery business enter the competition. The results have not been too satisfactory for obsolete equipment is often installed, excessive or over design is common or slow machines are included, a disastrous situation for efficient long term operation.

The contractor was asked for advice and assistance in obtaining bids on the above basis from American firms. Specification were sent to a member of top machinery suppliers and also to a group of consulting engineering or construction firms. The results were negative. In general the comments were:

- a) Machinery firms - Too much detailed design was required and too much outside purchasing was required to make the order worth obtaining. The cost was too high to obtain this information solely on the speculation of getting an order.
- b) Consulting Engineering Firms

The processing, detailed engineering, the choice of equipment has been made by someone as is outlined in the specification. We are not interested in acting as purchasing agents.

c) Construction firms

Our business is the design of plants and the construction thereof. The design has been frozen by the specifications so our know-how has been eliminated. The construction, our main business will be done locally. We have no interest in this project.

Such a procedure is hardly realistic if modern processing techniques and efficient operation is required.

The Yugoslav paper industry and the various sponsors if they want the best have got to make a change in procedure and must choose the procedure they want to follow:

- a) Give the complete job and whole responsibility to a firm such as the Industrijski biro. They in turn will take the detailed design, choose the equipment on the basis of highest efficiency from a large number of suppliers based on quality as well as price, design the buildings, supervise the erection, installation and start-up.
- b) Hire a foreign consulting engineering firm to do the above in a fee basis.

In either choice, the firm must be experienced in pulp and paper plant design, construction and operation with full knowledge of the latest technology or obtain in their unexperienced consultants and have no-conflict-of-interest by a connection with any supplier anywhere.

There is another problem of procurement which needs study. In 15. in cases, where a foreign loan is granted for a specific plant. In two cases, that are known, the loan or country has chosen its own instrument for the execution of the project. In a review of the

and the number of species to be identified. The number of species to be identified is not the only factor that determines the time required for identification. The time required to identify a species is also dependent on the quality of the specimen. For example, a specimen that is well-preserved and has clear features will be easier to identify than a specimen that is poorly preserved and has unclear features.

To obtain accurate data on the time required for identification, it is important to have some estimate of the quality of the specimen, as well as the potential for processing. After all, it is not possible to identify the best in a collection if the specimen is not well-preserved and cannot be identified.

Identifying Specimens in the Field

Identifying specimens in the field can be a challenging task, as the specimens may be in poor condition and may not be well-preserved. The field researcher may have to use various methods and techniques to identify the specimens.

In general, some of the challenges involved in identifying specimens in the field include the following: -
- The field researcher may have to identify small specimens, which can be difficult to identify accurately.
- Identifying over a very long period of time can be a challenge.
- The researcher may have to identify specimens that are not well-preserved and cannot be identified accurately.
- The researcher may have to identify specimens that are not well-preserved and cannot be identified accurately.

Identifying specimens in the field can be a challenging task, as the specimens may be in poor condition and may not be well-preserved. The field researcher may have to use various methods and techniques to identify the specimens.

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expansion and resulting shortage of skilled managers.

Only time, intensive in-plant training and careful selection can overcome the shortage of skilled managers and other personnel. Only aggressive production drive by skilled personnel can partially overcome low capacity.

In the future, expansion should be concentrated in speeding up and increasing the productivity of the present operations. There seems little economic justification for more new small 100 ton or less per day units.

A comprehensive analysis of the pulp and paper demands for domestic consumption and Yugoslavia's place in export would have shown that there are probably only 4 - 5 excellent pulp and paper mill sites in the whole country. These sites would be along the Sava River or its main tributaries where wide gauge railroads connect with the narrow gauge lines.

These new mills would probably have been 200 tons or more per day designed for efficient low cost operation. Such operations would have provided an abundance of low cost paper for either domestic or export.

As the present situation now stands utmost effort must be directed to cost reduction by more productivity, elimination of waste, excessive manpower, tight management control and improved raw material quality.

5. Knowledge and Training of Engineers

So far as could be determined the older engineers have excellent basic engineering educations, some have had the opportunity to study in Germany at the Technical High School at Darmstadt, some in Graz and at Grenoble, France.

ICA has sponsored many pulp and paper engineers to trips to European countries and some for American tours for observation.

Yugoslavia has followed closely over the years German practice and technology and in the contractor's opinion this technology at least so far as observed in Yugoslavia is not as advanced as it should be.

So far as adoption of American practices is concerned, very little or none has been noted either in operation or research.

Some of the reasons are that the travel in America has been too fast over a 3 or 4 months period - too many mills were seen over too large an area. Also the inspections were largely confined to the largest installations which in most cases cannot be compared to any Yugoslavian operation or the time at any one large plant was too short to absorb much which might be helpful for later application.

As for the younger engineers, it would be judged that they also have received a good basic engineering education. However it is probable that the Universities lack modern teaching equipment.

A case in point was a visit to the Ljubljana University Chemical Analysis Dept. For the number of students taking the course in analytical chemistry, the space and facilities were inadequate. The equipment was very elementary, similar to that which might be found in

a beginners' course in an American high school (Gymnasium).

It would seem that as the foundation for the future Yugoslavian industry rests upon these young engineers, modern equipment and techniques are vital in the teaching programs on the University level.

So far as is known, few if any of the younger men in the pulp and paper industry have the opportunity for advanced study preferably in the United States. Such study if possible should be concentrated on practical operations rather than on the theoretical.

It is also noted that some young engineers lack practical experience in the mills even tho some hold supervisory positions. Most American Universities require their engineering students to work during the summer vacations in industry. All who specialize in the pulp and paper industry must meet this requirement for graduation.

Preferably the under graduates should work directly in the maintenance department, on the paper machines, in stock preparation, pulp mills etc. as assistants to the skilled employees.

Thus they acquire practical knowledge, learn to take orders and obtain an understanding of the working conditions and workers' problems for later use as they move up ward.

Upon graduation many start even more intensive in-plant training, working thru all of the various departments before starting up the ladder of promotion and responsibility.

This procedure would apply regardless of whether the new man would concentrate on research, operation, sales, engineering or other phases of management.

Yugoslavia could well adopt such a system. Theoretical education is not enough to command the respect of the skilled workers. In fact it may do the opposite.

In a dynamic industry such as the pulp and paper industry where more new techniques have been developed since the war than in its previous history, it is vital that careful intensive and continuous study be made of the advances in world by the young and older alike.

This must be done, if Yugoslavia is to make progress and there are several ways to do it.

- a) Strict attention to all the published literature - translation and distribution to all industry supervisory personnel, research institutes and universities.
- b) Representative attendance at the various technical meetings largely organized in Europe, Canada and the United States by TAPPI and other technical associations.
- c) Staff visits between various Yugoslavian mills and the regular interchange of technical information and discussion of problems.
- d) Co-operative interchange of information between various chemical and other suppliers and the pulp and paper industry. This would cover the needs for new chemicals, wood, plastics, etc.

6. Quality of Products

Generally speaking there are two qualities: Domestic and Export. The latter is higher for it faces competition on a quality basis as well as price.

Such a differential seems unwarranted. Why penalize a domestic consumer because he is a Yugoslav?

It should also be pointed out that it is just as easy to make a good product as a poorer one, it reduces stocks to one quality and lessens inventory.

Quality in the paper industry starts in the forest, then progresses thru the Industry to the final consumer.

Thus the paper industry must start in the forest and obtain suitable wood of quality. The pulp mill systems must properly cook, screen, clean, bleach and ship properly prepared and protected pulp. In turn the paper mills must exercise extreme care all along their production lines to supply clean uniform quality. It is a big job, complicated, but attainable and necessary.

THE FOREST CLEARING

At the course of the past 12 months, my understanding and other sources, testifies, a number of timber areas

in plenitude, instructive, cooperative relationship is established to the Forest Service, the State of Washington and the Forest Service to change. Unfortunately, we do not have requested a collection of various methods which are now being provided for experimental purposes. It is a cooperative in helping to reforest the forest. Then because of the opportunity, the non-cooperative attitude of the State and long locator service prevent it to exceed in this project.

Information was obtained on a recovery system for nutrient, sulphur chemicals which process might be applied to reduce - but would not be feasible, preventing stream pollution and possible loss of soil productivity. It can not be done because of lack of interest among the primary foresting firms.

Assistance is requested in connection with the financing of the farm project. Corrective measures which are interested in providing a 7.5% interest for longer purchases as a loan.

The loan required as a condition for preliminary negotiation that I might be willing to pay a reasonable fee for a feasibility study. This fee to be deducted and to become a part of the loan if the loan is granted. The above information was passed along and in order, while interest is shown as 7.5%, as is often heard of and the total was dropped.

2) Travel

Travelability

The contractor at the expense of his own travelled to the various mills. The most extensive trips are along the Kuckut and the stretch to Elbae on the Lake. There is much in the output to Kielj - large logs - and jumbo logs. These trips were made when necessary to visit the mills in the Lake region, those in the Lake and in Velvado and a great deal of time was spent in this. Aside this, the contractor extensively travelled in West in the area of Kielj at his own expense to endeavor to observe the pulp and supply problems.

Outside of Legally

Brussels

The contractor at his own expense travelled to the meeting of the European pulp group of Tark at Brussels. This group of paper engineers and research men from all of the countries, Northern and Central European, a group which is a group for discussion of advances in techniques in pulp and paper making and all the time spent in this trip to the various mills in the meeting and to the mills which could be visited, such as the paper processing and paper making in the group.

The August visit to the Kielj - Kielj factory is important to the contractor in this year.

Understanding

The contractor has travelled to visit the miller, miller and owner of the mill to observe the first high yield sulphite pulp and to operate the mill.



This "inspector" is a 24-ton crane which has been built with American 40 ft. dimensions, after the manner of the American 24-ton crane which has been continuously modernized since 1928.

More possibilities of improvement in processing were noted which will be of a permanent character. However, K.F. has chosen and purchased other equipment for its system.

The contractor declined an invitation to visit the rest of the sawmills because of the personal expense involved.

Düsseldorf

The contractor at his own expense attended the "Messe" fair, a bi-annual exhibition of pulp, paper and paper precursors. It was an amazing exhibition of advanced techniques and an indicator of the future trends in printing and converting. So far as is known no Yugoslav paper user attended.

These meetings, visits and exhibitions were worth the contractor's own expense as they are one of the means in keeping up with the progress. Yugoslavia does not take advantage of these opportunities.

e) Lectures

The contractor is requested to give a series of talks to engineers and paper makers on a group of topics. The meeting is held with about 30 men present. The topics were discussed, pulp stock cutting and delivery to the paper mill with emphasis on mechanical handling as used by Leyenkuser, Majoron and Ellerbeck.

the other a discussion of papercard packaging, i.e.,
display designs as practice for the year.

Several other meetings are possible, but not likely
because of the vacation season. If final meetings
discuss the broad over-all pulp and paper needs as
scheduled, the purpose is to briefly review this infor-

U.S. GOVERNMENT PRINTING OFFICE: 1944 10-1200

1. Review of processing for a cotton stalk pulp and board mill for Ash River Area, Republic of India.
2. Information request filed.
3. Outline of preliminary cold soda experiment.
4. Ash River pulp and board mill project reviewed.
5. Ash River pulp and paper project plans reviewed.
6. Institute experimental paper machine specification prepared.
7. Information developed on the economic factors affecting Ash River project in India, covering raw material, water supply, labor, climate, etc.
8. Ash River pulp and paper project plans reviewed.
9. Information collected at universities given to the Institute and others.
10. Mill recovery system information submitted.
11. Chancery Republica - Bolivian. Information checked and transmitted to the Institute.
12. Investigating report on Cold Soda pulping prepared and distributed.
13. Report on cellulose agent prepared as requested by Mr. Lunder.
14. Cold soda processing of agricultural waste.

15. Review and Comments on 6 months activities, and strategy.
16. Index and later Additive preliminary report.
17. Observations and Comments on Vider Krško.
18. Observations and Comments on Žužemberk.
19. Modvelna wet machine project reviewed.
20. Observations and comments on Revše.
21. Observations and comments on Nedvodec.
22. Outline of High Yield Sulphite Experimental program - Calcium and Sodium base.
23. Interendum on contract provisions and revisions.
24. Acid Sulphite pulping of Douglas Fir.
25. Observations and Comments on Šentiljsko Paper and cellulose mill.
26. Waste Paper Quality Improvement.
27. Preliminary outline of experimental work required for Tožnica Viscosa Pulp Mill.
28. Information developed on Shadow or Shell marking at Black vrh.
29. Shave pulp and paper project plan reviewed.
30. Observations and Comments on Želešče.
31. Observations and Comments on Maglaj.
32. Observations and Comments on Prnjavor.
33. Observations and Comments on Vježnica.

34. Observations and comments on aging latex.

35. Basic weights - standard size of latex to metric measurements.

36. Problem of Cold Soda High Yield Sulphite Coatings.

37. Neutral sulphite as cessing of coagulation and for long latex.

38. Observations on Coatings on adhesive sulphur paper fill.



The following information is respectfully requested in order to obtain knowledge and background of the Pulp and Paper Industry. With the information requested, faster and better solution to problems will result.

I. Raw materials

A. Coniferous Woods

1. Species
2. Location by species
3. Areas of accessibility under present conditions
4. Areas of future accessibility - plan of opening up these areas and when
5. Land area of accessibility in hectares and some classification of size of plots available for harvesting
6. Average stands in volume by species
7. Annual growth increment by species
8. Management plan of harvest with due regard for steep slope, high elevation, reseeding of cut-overs
9. Reforestation plans
Reseeding
Planting and nursery plans
10. Availability of saw mill and wood working waste - species, type and volume at locations.

B. Deciduous Species:

Some information as on coniferous species.

C. Annual plants:

Straw - rice, wheat, millet, barley, flax,
Canes, Arundo Donax, reed and other canes which
might be found along Danube & tributaries,
coastal region

Stalks - upland cotton - corn, hemp, butts & waste
Names, availability in areas - present use for fuel,
cattle fodder, thatch or other uses



Exhibit 2

Program of expert's activity.

The plan of 1959 Technical aid foresees the expert's activity in the field of semi-chemical pulp production. There are 3 main lines of activity:

- a) laboratory work (testing of indigenous raw materials)
- b) engineering work (setting up of mostly suitable technological production processes, taking into account the economy of such processes)
- c) the settling of a plan for erection of semichemical pulp and paper mills in this country.

To enable the performing of activity mentioned under a), through the project 1959 (NO.3/152-25-110-5-90280) following main apparatuses were purchased:

one heat exchanger to the existing lab. digester 150 L
one electric screw extruder to the same apparatus
one group digester, capacity 6 x 1 litre
one Sprout Waldron refiner
one Valley beater
one folding endurance tester
one centrifuge
one pulper.

On the installing of these apparatuses the performing of laboratory tests will be assured. Many tests can be already performed to-day.

We don't know enough about the special field of activity of Mr. Peret, so it is not necessary to fix for a longer period his daily work. Anyhow, we suppose following program for the first two months:

1. 20 days: rest taking information about activities of our Paper Institute and introducing the expert to other related institutes (of forestry etc) and institutions (Engineering biro Ljubljana and Zagreb)
2. 5 days: settling a definitive program of laboratory work in the Institute
3. 35 days: Performing of tests.

There is the laboratory personnel available. The expert's activity will be limited to giving advise in this work.

Ljubljana, 17.1.1961

INSTITUT INDUSTRije
PAPIRJA
LJUBLJANA-VIVČE
(Ing. Bonač Stane)

1. Chemicals available in Yugoslavia and Europe:

Chlorine liquid,
Bleaching powder,
Caustic soda,
Sodium Sulphate,
Spent Rayon liquor,
Sulphur,
Sulphuric acid,
Sodium or hydrogen peroxide,
Magnesium Sulphate,
Silicate of Soda,
Sodium Hydrosulphite,
Zinc Hydrosulphite,
Aluminium Sulphate

1. Prices per kg or metric ton, delivered duty paid.

2. Paper making chemicals:

Rosin size,
Kaolin,
Casein,
Torch,
Urea or Melamine resins,
Latex or elastomer resin emulsions.

Prices per kg or metric ton delivered.

III. Waste paper availability -

Domestic conditions in Yugoslavia

A. Wood pulp substitutes,
Envelope cuttings,
All bleached white pulp cuttings,
Corrugated shipping case cuttings,
Kraft bag wastes

B. De-inking grades -
Office waste,
Old magazines

C. Board making wastes,
Old corrugated boxes,
Old multi wall sacks,
Old newspapers,
Mixed paper

Tonnages available by grades,

Description of sorting and distribution



- A. Paper and paper board production by volume and grades for past 5 years.
Future expansion plans - presently 2 million cu. ft. under construction.
Anticipated but not formalized.
Locations under consideration.
- B. Paper and Paperboard Consumption.
Imports by grade and origin,
Exports by grade and origin
- C. Volume used by Industries.
Packaging types and products packaged,
Printing
Converted into business and cultural use
Converted products, towels, toilet paper etc.
- D. Expansion plans of package using industries - cement, sugar, food, can goods, bottled goods, consumer products, textiles etc.
Expansion plans for printing plants.
Plans for export.
- E. Shifts in consumption patterns such from tile roofs to fire proof shingles, built up membrane roofs etc.
Use of wall board, hardboard, etc. to replace lumber, plywood etc.

V. IIP - Research laboratories:

1. Would like a list of all equipment on hand of a major nature - do not include glassware, small items
2. List of all equipment presently on order but not delivered - expected delivery date
3. List of equipment desired to complete the laboratory objective
4. Summary of various pulping experiments made by laboratory

Note - Items which seem to be lacking:

1. Microscope with photo attachment.
2. Concorza tester with press and ring compression tester unit
3. Fiber classifier - Mc Nett or Clark
4. Chip screen and chipper
5. Centricleaner 3" and possibly a 6".



VI. Pulp and Paper Mills

A. List of Pulp and Paper Mills

1. Pulp mill process- raw material
2. Capacity in tons per 24 hours
3. Age of mill
4. Type of wood used
5. Location
6. Number and size of digesters
7. Bleached and unbleached

B. Paper Mills: Location

1. Number of machines
2. Widths
3. No. presses each machine
4. No. dryers, width, diameter
5. Speed, maximum & minimum
6. Weight range
7. Types of products made by each machines
8. Average production 24 hours, each machine
9. Maximum production each machine,
at weight, speed & width
10. No. of calenders, size of rolls
11. Other equipment, size presses,
smoothing presses, winder, reels and sheetens

24 Jan. 1961



List of Institute's published works.

- 1) L'influence of chemical and technological sulphite beech digestion proceeding conditions on chemical composition of the pulp.
Bilten Gen.dir.sav.ind.papira, Ljubljana, 1 (1948) 50.
- 2) Maize semichemical pulp and its properties as raw material for paper industry.
Glašn.hem.društva, Beograd, 15 (1950) 219
- 3) L'influence of delignification of straw by digesting under atmospheric pressure on the chemical composition and properties of resulting pulps.
Kemijski zbornik, Ljubljana, 1951, 59.
- 4) Deling and bleaching of beech pulp and its transformation to viscose.
Glašn.hem.društva, Beograd, 16 (1951) 261.
- 5) Some characteristics in the properties of sulphate pulp made from bosnian spruce and pine.
Glašn.hem.društva, Beograd, 17 (1952) 215.
- 6) Modification of H.Niehammer's apparatus for volume unit of wood weight determination.
Glašn.hem.društva, Beograd, 18 (1953) 295.
- 7) Properties and usability of our poplar wood for pulp production.
Vestnik Slov.kem.društva 1 (1954) 53.
- 8) Extracted oak and chestnut wood chips as raw materials for pulp.
Glašn.hem.društva, Beograd, 19 (1954) 427.
- 9) *Salix alba* as raw material for pulp production.
Vestnik Slov.kem.društva 1 (1954) 185.
- 10) Chemical testing of beech wood originated from slovene forests.
Vestnik Slov.kem.društva 2 (1955) 33.
- 11) Lime tree (*Tilia grandi-folia*) as raw material for pulp.
Glašn.hem.društva, Beograd, 21 (1956) 171.
- 12) *Populus tremula L* as raw material for pulp and paper production.
"Topola" Bilten Jug.nac.kom. za topolu 1 (1957) 93

- 13) In cooperation with prof. Šemec:
Influence of different types of starch on the mechanical
paper properties.
"Die Stärke" 9 (1957) 125.
- 14) Chemical testing of bosnian beech.
"Šumarstvo" sv. 1/2 1958, 58.
- 15) *Populus tremula* L as raw material for sulphite pulp
production for use in paper industry and for further che-
mical conversion.
"Topola" 2 (1958) 595.
- 16) Partly rotten wood as pulp raw material.
"Šumarstvo" 1959.
- 17) Forest and saw mill wastes as raw materials for pulp
production.
"Tehnika" XIV br. 4.
- 18) Differences in technological digestion conditions for
sulphate and sulphite pulp from spruce, beech and poplar
wood.
"Tehnika" XIV br. 5.
- 19) Differences in technological digestion conditions for
sulphite pulp from spruce, beech and poplar under
different pH values.
In print.
- 20) Chemical and technological conditions for rice straw pulp
and semichemical pulp production.
In print.

Ljubljana, 24.IV.1961



Exhibit 4.

History and comment

Technical Assistance Contract 1801c

Upon arrival March 15, 1961 an initial program was presented which outlined the following:

"Three main lines of activity

1. Laboratory work - testing of raw materials
2. Engineering work - setting up most suitable production processes - taking into account the economy of such processes
3. Setting of plan for erection of semichemical pulp mill."

"As the Institute does not know enough Perry's special field of activity it is not realistic to fix a period of longer than 40 days". Of this period 20 days was to be devoted to taking information about the activities of the Institute and other related institutions of Yugoslavia, the Engineering Büro, Ljubljana and Zagreb. 35 days were set up for making tests. Laboratory personnel would be available, Perry's activity would be limited to giving advice".

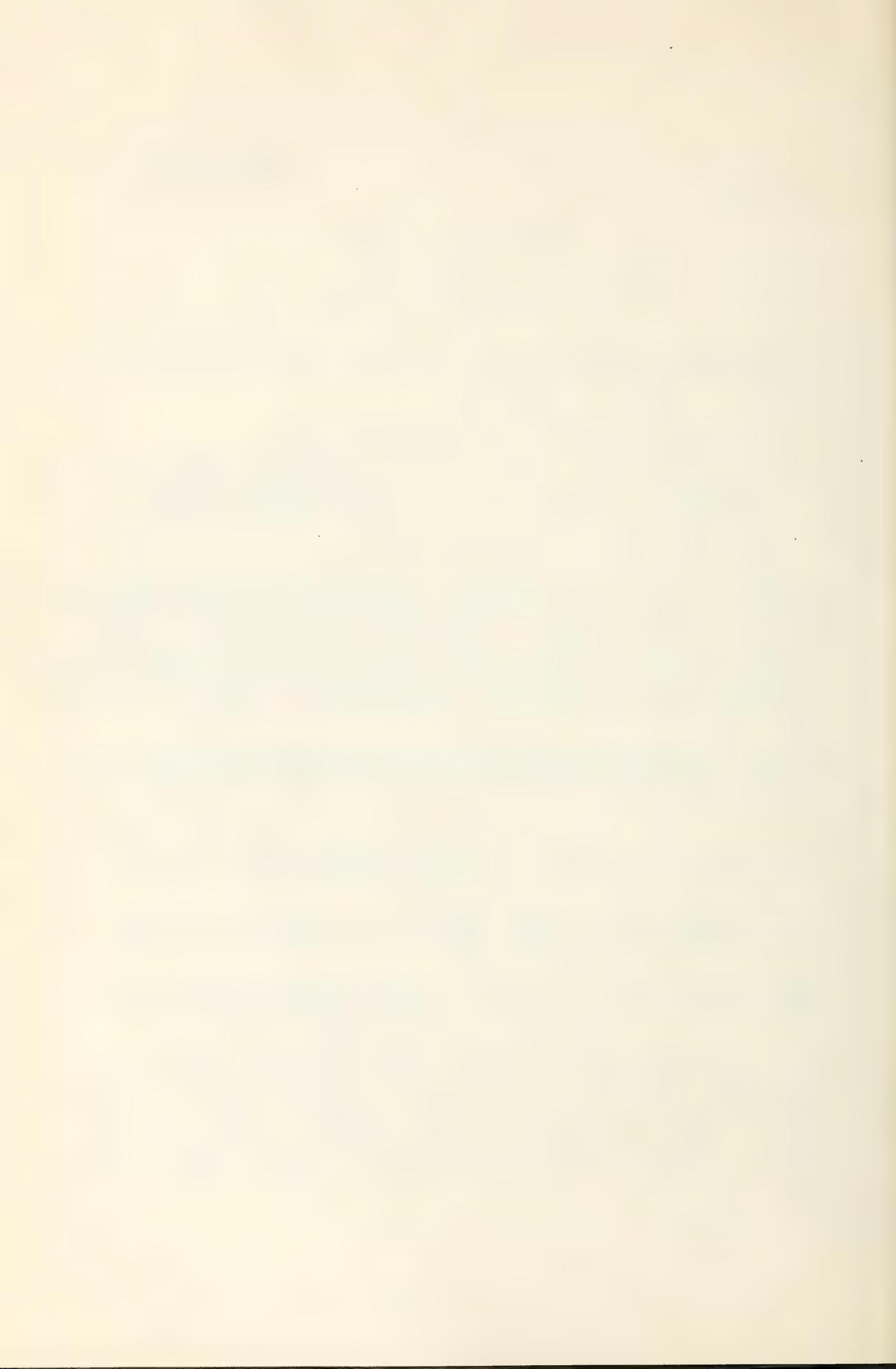
Early in the period information was requested by contractor so that background information and knowledge could be obtained so that some practical plans could be made. It has never been received.

It was late May before any laboratory personnel were assigned. Then work was started as it could be fitted into the work schedule. As a result progress was slow.

As time permitted pulping trials were carried out on spruce, beech, poplar, agricultural wastes. The addition of latex to the beater was demonstrated.

Contractor supervised and did a great deal of the work himself assisted by a young engineer who carried on most of the routine. Technicians made the physical tests.

As for the engineering work and plans for erection of pulp mills, there are not functions of the Institute. Advice and assistance was given to the staff of the Büro when asked for. It was asked for and advice and assistance was given on Donji Štrur, Ljubljana, Štrukljevo Büro, Tolmin, Drvar, Podvelka, Plaveč, Zagreb and many other projects. They covered a wide range of items, geographical, economic, technical information etc.



Repetitively installation of certain classifiers was asked for so that cold soda pulping wood could be completed.

Other chemicals of known purity have been asked for so that none of the spruce semi-chemical work could be completed.

Work on groundwood brightening for Videm is to be done. It has been held up pending receipt of Zinc dust.

Back in May when progress on pulping was insisted upon, the Institute claimed that they had never seen the contract and the contents were unknown. The Contractor supplied his copy. 27 questions which were asked and they covered paper specifications, rules etc., also 21 organizational, technical and financial problems etc. were answered promptly.

As for the terms of the contract which was written by the person is unknown to the Contractor or TAA and signed by the Yugoslavian Embassy for TAA. It can be assumed that someone approved the contract and the Yugoslavian Embassy Washington was authorized to sign.

It also must be assumed that USOM/Y was in constant contact with TAA and ICA/W in the development of the PIO/ta and contracts. This contract took one year to prepare and get signed. The same therefore will be commented upon:

Art. I-A-a (First 6 months)

1. This requirement was included at the request of the Contractor and the information received has been most helpful.
2. Advise and train Yugoslavian engineers in proper use of deciduous woods etc.

Comments: The Institute has been asked repeatedly for a summary of its pulping projects so that a starting point could be determined and any gaps filled. No information was received except a list of the publications by Mr. Maširević. Obviously the Institute has done a great deal more than was listed. In fact it was obvious that most of the species of Yugoslavian woods have been pulped many times in the past years. If the research has been carried out in an orderly fashion little more knowledge seems needed on a laboratory basis of pulping these woods by the conventional methods of sulphate, sulphite or NSSC.

It was quite obvious from the discussions that the cold soda process which is some 10 years old was largely unknown because the argument was advanced that no pulping process could be as versatile as it had been described. Yet the process is in operation in the USA, Japan and there may be installations in Europe. Some 1,200 tons is produced daily for use in newsprint, book papers, tablet papers and various boards. It seems likely that cold soda will remain sulphite because of its lower cost and versatility. Actually it is the only economic way to produce a good quality groundwood type pulp from hardwood.



The work upon beech an old Institute has demonstrated the a groundwood type pulp equal to a rice groundwood can be made. It is equally true that if large amounts of poplar are to be used in newsprint cell. The pulp will have to be used.

The Contractor has made a statement that the Institute has ignored the cold soda process even when it was found out that the Zagreb Paper Mill had had research work done in the USA and had purchased the equipment and the Industrijski bistro had designed the plant. This work was done on poplar, a minor species in Yugoslavia growing only in plantations. No work was done on Beech, though it is the predominant species.

In January 1962, the contractor was informed by the Institute that it had investigated cold soda beech pulping and had concluded it was impossible; as further proof it showed a letter from a Danish firm which stated that they had tried it in 1959 and had abandoned the idea. No details were given of the operating conditions. These statements were presented ~~regarding~~ of the results obtained in the laboratory during the Summer and Fall of 1961. These results were those of the Institute's own technicians.

Just how this investigation was carried out without a commercially built refiner in the laboratory has not been explained. The Spout Waldron Refiner given by USOM was not delivered until October 20, 1960.

Some of the reluctance to this development stems from a visit by a Yugoslavian team to the Great Northern Paper Co. This Company "built a very extensive plant using the Chemi groundwood" process as developed some 20 years ago by the N. Y. S. College of Forestry.

It essentially consists of impregnating pulp wood logs with neutral sulphite cooking liquor, cooking and then grinding the logs.

There is no question about this process work technically, however, the impregnation of whole logs poses some difficult production problems which Great Northern has learned the hard way.

The capital costs and maintenance costs are fantastic. So far as known, the Great Northern plant is the only one that has ever been built. It has been rumored that Great Northern has given up the process in favor of cold soda as of Jan. 1961.

There seems no point in going back 20 years to an impractical process. It is not even a consideration any more than a day or two at the plant of Gr. Northern.

At the original negotiations, particularly when the application was filed, it was agreed that the Institute would receive research rewards for Videm Krško and Prijedor.

Develop plans for use of domestic raw materials etc.

Comment: Requests have been made for 11 months for information on availability of raw materials, availability of chemicals and other necessary data so that some orderly plans could be made. Nothing definite has ever been supplied.

In fact the Contractor doubts that such a study is within the scope of a chemical research laboratory. The information required to complete such a plan is in the field of engineering and economies.

Assist in choice of equipment and installation of equipment etc.

Comment: The choice of equipment is an engineering design problem and involves work with the engineers who are designing the plants and the groups which will operate them when the plants are built.

A great deal of this work has been done as far as choice of equipment is concerned at the Biro. It is not within the scope of the Institute.

So far as installation is concerned no plants wherein a choice of equipment has been recommended will be in operation for at least a year after the contract expires.

for plants which are completed and in operation when requested. There are several in operation which are available.

Recommend uses of pulp for final use.

Comment: On October 14, 1961 the Contractor urged that the cold soda processing be completed so that evaluations of different kinds of fiber combinations could be tried out.

Nothing further has been done as of February 1, 1962.

This Contractor refuses to guess or read crystal balls in instances like this. The type of fiber or even which kind of products appears to be a minor consideration.

Even with the most careful laboratory evaluations the jump from the laboratory to commercial operation is hazardous at best even with full knowledge of the proposed production facilities. Only an approximation can be hoped for.

It was suggested that a test commercial plant be designed to prove the Sremek-Mitrovic plan at Videm Krško, actually using Serbian poplar, but the idea was turned down because it would interfere with production.

Videm reports the maximum amount of poplar they can use is 15 - 16 % at speeds of 350 meters per minute.

Actual Work

Continue first 6 months activities etc. and demonstrate.

Comment: Such work has been done in pulping by the Contractor with the assistance of junior engineer. This engineer has been instructed in such techniques as have been used.

2 Define the proper role of the Institute etc.

Comment: On October 14, 1961 information was requested as to the future plans of the Institute, its budgets, its relationships with the Paper Industry, the Ljubljana University etc.

In January 1962 it was pointed out that no information had been received. Counterpart pointed out when time was available, the information would be supplied.

It was pointed out that now was the time, the contract had less than 8 months to run and with the financial conditions as it is someone with an outside view point had better develop an organizational plan in view of the completion of the new building and the increased overhead.

May be called up to visit mills, offer advice on reconstruction.

Comment: While this requirement is out in the latter phase mill visits should have started as convenient in the first 6 months so that background could have been developed. Later visits could have gone into more detail if necessary.

The excuse given during the first period was that the mills were too busy on production to bother with foreign assistance and permission to visit was denied.

A protest was made to the President of the Paper Association who promised to correct the situation. He did.

Furthermore, it is pointed out that during this 11 month period most of the mills have been engaged in expansion and reconstruction projects. Technical assistance should be rendered during the development of plans not after the fact.

~~Technical assistance~~

It is judged that with the general lack of information requested and the low priority of technical assistance and lack of facilities, the contract is at least 6 months behind schedule.

Considering that the contract should be completed September 5, 1962, the end of 18 months, it must be remembered that there are final reports to be written and reproduced, holidays, leave and travel time to be considered.

With the time allocated in getting things done, actual work on any projects would probably have to be completed by July 15 or August 1, 1962 at the very latest.

As for the requirements under the above article

Advise regarding long term plans etc.

Comment: The development of long term plans is probably the most vital project in the contract as far as the future of the Industry is concerned.

It was pointed out to ICA/W that this study should have been undertaken first, because, until a logical plan of development is made all other projects are immaterial.

It must be remembered that paper is a raw commodity and the industry is a service industry.

Paper or paper board in a sheet or roll is valueless until someone wants it to write on, print, make a box, bag, carton or use to wrap an article.

Thus an intimate knowledge of the development of all industry is necessary including the development of competitive materials and methods of shipping.

Six months to complete such a project would probably be sufficient providing information was immediately available and the Institute had the time to assimilate, summarizing and analyzing the information.

Offer assistance in organizing facilities etc.

Comment: This is more or Art. I-1-b2 which has not been started. Little training seems necessary as the present staff has been trained by the senior engineers and additional training is not required. The work will not begin to be completed, a year away at least.

5. Advise existing mills on reconstruction etc.

Comment: This is also more of the same taken from Art. I-1b-3. No further comment is necessary.

Conduct demonstrations in use of laboratory testing equipment.

Comment: This is more or Art. I-1-b-3. The Institute has equipment available to demonstrate to the industry world wide. The equipment is in constant use by the Institute technicians as is required by their work. Both senior engineers are familiar with its proper use and care and should be after 30 years of experience.

This clause therefore is a waste of time and unnecessary.



Report on work planned.

On January 19, 1962 a schedule of the second advisory activities was received, the tasks agreed. The Videx views and comments were also completed in rough draft form and have been submitted for further review.

In this schedule are many projects which should have been undertaken during the first six months period.

The contractor has been told (Jan 17) during a discussion following a meeting with Mr. Verrier and the Institute had no idea of the contents of the contract; that the Institute wanted only someone to advise them on general over-all problems; that the Institute would use the advice when they saw fit and that it might be years before any work was done on it.

That compliance with the contract would be satisfactory when the advice was received, that no results other than these were necessary or expected. A letter to this effect was requested.

As for other projects listed in the schedule. High yield acid sulphite pulping is of urgent concern for Videx and probably several other mills. It was logical to have done this work when the cold soda studies had been completed. Cenuri cleaners are necessary. There are several techniques to be tried out.

As for the use of beech (item 2) in newsprint and other papers, no concrete answer can be given until the work which was started is finished. Back in October it was pointed out that evaluations based on facts were necessary and completion was urged.

Opinions based on guesses are just not good enough.

As for the use of Douglas Fir (Item 3) it has been pointed out this species is used in sulphite mills. It is not used for sulphite production because some of its chemical components prevent satisfactory pulping. A brief report is in preparation.

As for bleaching of groundwood, work has been done on this using Sodium hypochlorite and Hydrogen Peroxide at Institut. Both methods are probably too expensive except for high grade printing papers.

emulsions brightening with sulphite oxide or zinc hydro-sulphite are common practice and should prove not too difficult. Vavda uses the former method with success.

peri-chemical pulp production (Item 5) should pose no particular problem when the facts are developed. After all the Institute has been cooking with this process for years. It was developed at the U.S. Forest Products Laboratory during the 1920's.

As for Prijedor nothing is known of this mill or the problems.

As for Belišće it has been in trouble for months, and tests have been made at the Institute. The results are unknown. When the problem first came up last spring request was made to see the operation. As it was still under guarantee, request denied.

As for bleaching semi-chemical (Item 6). There is nothing complicated here. The Institute has been bleaching these pulps for years.

The use of bleached - unbleached semi-chemical pulps (Item 7) pose no major problems when the qualities are known and the types of papers required are known.

Speeding up of sulphite process (Item 8). The comments on Videx contain ideas for this as practiced in North America. The principal method or process is the well known "Chemi-pulp" process for using calcium base acid.

Unfortunately acid sulphite requires thorough penetration of the acid liquor which limits a speed up and the use of continuous cooking. Ammonia base gives faster penetration, however, Ammonia is probably in limited supply in Yugoslavia and has more important uses.

The sulphite process is considered obsolete and therefore improvements are limited to getting the most out of existing mills.

The use of Maize waste (item 9) and other agricultural wastes pose no technical problems so far as pulping is concerned.

They however pose presently unsurmountable problems in collection, storage and use except in special situations.

It has been recommended in a special report that until the wood supply is fully utilized, consideration of all agricultural wastes be abandoned.

General suggestions (item 10)

Any general suggestions asked for have been given and this will be continued.

As for the waste paper quality, this poses a complicated problem as the industry is not organized. The quality is poor and improvements which can be made will have to be studied at the source.



C. Projects Planned for the Paper Industry

This requirement should really have been first to and been started and as was reported to ICA/Washington when the first cans up.

It is elemental to make paper and build mills to meet the end use demand requirements.

The contractor really believes that it should have top priority.

D. Project Requirements of Lower Priority

1. Advise on the Institute function etc.

The contractor has had considerable experience in the establishment of research organisations and knowledge of how many of the world famous ones operate. This project is more than just report writing. It is a matter which should probably be considered by a committee of all interested groups. Any advice however on basic function will gladly be given to any control group.

E. Projects which should be dropped

1. Demonstration of equipment.

2. Theoretical design of any plants. Specific advice is regularly given.

3. Any training function.

F. Such Other Advice etc.

1. Any advice on wood supply, waste paper quality or on other questions will be given as time permits.

It should also be made clear that, if these projects are to be completed, any information requested must be made available immediately and that such services as typing, translations etc. must be done quickly by competent persons.



Conclusion

Eleven months have passed a tremendous amount of work remains to be completed and a large amount has not been even started so that efficient action is necessary.

This report states what should be done which in the contractor's opinion is important. However TAA and the Paper Industry Association should be the final judges of what is important and assign the priority. However under no circumstances should the completion of the pulping studies be stopped.

Attention is also called to the fact that while this contract is between TAA and the contractor USOM/Y and AID/W have an interest and apparently must approve any changes in the requirements because performance is judged solely upon the written contract as it was signed.

Respectfully submitted

Henry J. Penny

16.11.1961
Industrije papirja
Ljubljana-Vevče

Ljubljana, 1. March 1962.

Schedule of expert's activity
for the next 6 months

(period of time between December 1, 1961 and May 31, 1962)

Expert: Mr. Henry J. Perry
Institut industrije papirja, Ljubljana-Vevče.

Basic plan: semi-chemical and chemi-ground wood production
paper and board production for wrapping
purposes.

Details of the projects.

No 1: High yield pulp production / semichemical pulp by acid sulphite process.

Pulp mill Videm Krško..... 3 days in XII, 5 days in
January-February 1962.
Pulp mill Vevče (Medvede).... 4 days in I - II. 1962
Industrijski biro 5 days in I - V. 1962
Institut Vevče 5 days in January 1962

No 2: The use of peach wood for newsprint production.

Pulp mill, paper mill Videm-Krško
..... 5 days in II/I
Industrijski biro 3 days in IV/V 1962
Institut Vevče 5 days in I/I

No 3: The use of Douglas fir for paper industry.

Pulp mill Videm Krško 3 days in I/II 1962

No 4: Ground wood resp. chemi-ground-wood production. Blaschka

Paper and pulp mill Kolsko 5 days in I/III 1962
Pulp- and paper mill Videm-Krško 3 days XII-1961 and 1962
Industrijski biro 15 days I - V. 1962
Institut Vevče 5 days I/II 1962



Wet

Wet

Wet

No. 5: Semicchemical pulp mill production (neutral) semi-chemical
Wet

Pulp and paper mill Vevča

Pulp and paper mill Prijedor ... 3

Industrijski biro (including
pulp and board mill Belišće)

Institut Vevča

No. 6: Bleaching of semichemical (neutral sulfite) pulp.

Pulp and paper mill Vevča (Medved)

Pulp and paper mill Prijedor ... 3 days (XII and I)

Pulp and paper mill Prijedor ... 3 days (XI/II 1962)

Industrijski biro

No. 7: The use of bleached and unbleached pulp in paper production

Pulp and paper mill Vevča

Paper mill Količine (wrapping
papers and boards)

Paper mill Vevča (wrapping
papers)

Paper mill Radeče, specialities, 5 days

Pulp and paper mill Blatki vrh

(wrapping papers and boards) 3 days (II/IV 1962)

Pulp and paper mill Čeršek for

wet boards for wrapping

Industrijski biro

2 days (I - V 1962)

No. 8: Speeding up of acid sulphite cooking process
(discontinuous and continuous process).

Industrijski biro

8 days (X - V 1962)

No. 9: The use of maize wastes for pulp production
(semichemical and full-chemical pulp).

Industrijski biro

8 days (I - V 1962)

No. 10: General suggestions concerning

a) Productivity (man-hours per ton of

b) Opinion, concerning the quality of

c) Reconstruction suggestions

d) Suggestions concerning waste paper collection

and use.



The final objective of the proposed forecast investigation, increased production, lower costs and very possibly better quality will depend upon the cooperation received in supplying economic data, the liaison between the various mills and agencies concerned and the contractor.

In the great multitude of problems facing the industry the above projects must be carried on to the points of application. Research for academic interest Yugoslavia cannot afford for some time to come.

It should be noted that the contract calls for assisting in choice of machinery, developing plans for better use of raw material resources, expansion, modernization etc. The fact is that these functions are not the concern of the staff of the Institute nor does it have the facilities to carry out such activities.

From such observations as have been possible much of this work seems to be the function of the Industrijski biro.

It is probably authorized by a wide variety of agencies such as the National Investment Bank, the Paper Industry Association, the individual mills and a variety of cooperative enterprises proposed in the plan.

In order to function properly, it becomes imperative that detailed objectives be supplied and that the supporting data be freely given and discussed.

Absence of such information not only prevents the successful conclusion of the contractors work, but can also result in unproductive use of the Yugoslavian investment funds.

Proposed Six Month Period

1. Continue with the refinement of the pulping programs. This objective can be reached if the support required is supplied.

2. A second project come into focus during this period. It is "define the role of the Institute".

The Institute is presently confined to very cramped quarters and its effectiveness has equally been creased. This condition will be partially corrected when the new building is completed in the next year or two.

Therefore it seems imperative that the proper role be defined in broad terms of scope as the objectives. If the plans of development be specific so that Yugoslavia can benefit from the large investment in buildings and equipment without risk.

From what has generally been observed the Institute seems to be in a precarious financial position. As such it is required to spend time on projects of low priority benefit to the economy which, however, offer a financial return to the Institute.

The following information was given in response to the question as to what a proper role of the Institute can be defined and its effectiveness increased:

1. Its present financial position and its future financial position.
2. Its present and future research activities.
3. Its present and future educational activities.
4. Its proposed budget for 1962 and the budget planned upon completion of the new building.
5. Its proposed methods of financing its expanded activities in the new building.
6. Its past liaison between the various agencies concerning with the paper industry expansion and the present paper mills.
7. A list of all projects undertaken during the past three years.
8. A list of all the present and proposed facilities of the finished Institute plan.
9. Outlines of present staff and their functions.
10. Details of the proposed new building.
11. Details of the proposed equipment to be used in the new building.

It is felt that the Institute should be compared with the role of the I.I.T. and the I.I.T. should be made to improve the Institute. Certainly there seems to be a crying need for a well managed adequately financed Institute capable of solving the many technical problems facing the pulp and paper industry.

It is felt that the Institute should be given the following functions:
1. To promote research in all fields of paper production.
2. To promote research in all fields of paper production.
3. To promote research in all fields of paper production.
4. To promote research in all fields of paper production.
5. To promote research in all fields of paper production.

It is felt that the Institute should be given the following functions:
1. To offer advice on reconstruction and design of facilities. The past six months have shown that these functions are not the concern of the Institute.
2. They are vested in the Industrialist's Biro which is not only in pulp and paper on a national basis, but all types of industry as

American and Foreign Firms and Organizations Cooperating with the Contractor:

The United States Department of Agriculture
U. S. Forest Service - Washington
U.S. Forest Products Laboratory, Madison, Wisconsin
The United States Government Printing Office, Washington
The New York State Conservation Department, Albany, New York
The University of Maine, Orono, Maine
The Institute of Paper Chemistry, Appleton, Wisconsin
New York State University, College of Forestry, Syracuse
The American Paper and Pulp Association, New York
The Waste Paper Utilization Council, New York
Jard Paper Co., Merrill, Wisconsin
Bauer Bros., Springfield, Ohio
U. S. Machinery Co., Switzerland
Ing. Piesslinger, Linz, Austria
Mürzstaler Zellstoff- und Papierfabrik, Bruck a. d. Mur
IMPCO, Nashua, New Hampshire
Beloit Machine Works, Beloit, Wisconsin
Trimbley Machine Works, Glens Falls, N. Y.
Grundler of. St. Louis, Missouri
Comm. Tonello & Figlio, Milano
Alvin H. Jonhason Inc., New York
Lummus Inc., Paris
Sund Machinery, Paris and Sundsvall, Sweden
George Sivola, Helsinki, Finland
Huyck Corp., Rensselaer, New York
Cobelco, Bruxelles
R. P. Andrews Co., Washington
Niagara - Mohawk Power Corp., Syracuse
National Welding Co. Ltd., Montreal
Blaw Knox Co., Pittsburg, Pa
Canadian Pulp and Paper Research Institute, Montreal
Canadian Pulp and Paper Association, Technical Section, Montreal
Hooker Chemical Co., Niagara Falls, N. Y.

